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## GENERAL SPECIFICATIONS

Electric Motor Bodies are constructed injection type Aluminium, designed to comply with IEC and DIN Norms and rules to ensure long life and reliability. All motors are Squirrel Cage Induction type with air cooled body. Motor protection switches should be fitted if necessary. All motors supplied with wiring diagrams inside of its terminal box.

The motor power data indicated below refers to (S1) continuous operation. The motors are supplied for the standart voltages 230 V, 400 V, 690 V – 50 Hz and can be operated with reduction of the rated power, with variations of the rated voltage up to  $\pm 10\%$ . Foot mounted motors are used in most of our applications unless otherwise agreed. A.C. Motor Protection Switches, Starter, A.C. Electronic Speed Controllers (Frequency Converter) and Multi Speed Motors are available on request.

### MOTOR VOLTAGE

<b>Standard</b>	: A.C. Three Phase 380 V ( $\pm 5\%$ ) – 50 Hz ( $\pm 3\%$ ) : A.C. Single Phase 220 V – 50 Hz (some models)
<b>Optional</b>	: A.C. Three Phase (400 V – 415 V – 50 Hz) & (440 V–60 Hz) : A.C. single Phase 230 V – 240 V – 50 Hz : D.C motors

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## MOTOR PROTECTION

(Standard Supply)  
(Optional)

: IP 55 class motors  
: IP 56 ( waterproof)- IP 65 (dustproof)  
EFF1 and EFF2 high efficiency / improved efficiency motors  
are optional

## INSULATION CLASS

(Standard Supply)  
(Optional)

: F class motors  
: H class motors (for high temperatures)

## BEARING

**Standard** : Life time lubrication 6000 Series ball bearing are fitted on  
the drive and non drive ends of the motor



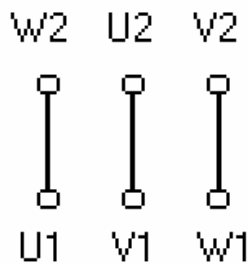


## SERVICE INSTRUCTIONS FOR THREE PHASE MOTORS

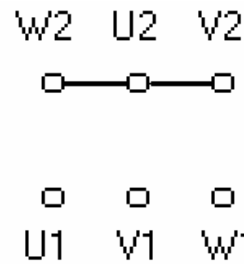
1. The motor has left our works ready for operation, all test are done, with a proper nameplate. Upon receipt please check, if any external damages and Inform such cases to your nearest representative or EMAK directly.
2. To ensure trouble free commissioning the care should be taken to ensure that the motors are not exposed to any harmful effects during transport and storage. When the motor has not been used for a prolonged period of time, the following work must be performed before commissioning.
  - Inspect the bearings and renew the grease filling, if necessary.
  - If the winding was in very humid conditions, you must dry the winding using hot air.
3. The rotor of the motor is dynamically well balanced. Pulleys which are too small or too wide, just like belts with an excessive tension or misaligning of shafts may damage the bearings and shaft. Please take care that the four feet are evenly loaded. You can prolong the service life of your motors by aligning them carefully. This applies to motors both with flexible and with non-flexible couplings. Even Slight misalignments may very rapidly result in damage to the to the bearings. Please take care that the four feet are evenly loaded.
4. The cooling air flow may not be deteriorated by any prevention.

By observing strictly the intervals at which the motor should be lubricated as well as the quantity of grease to be used over period of 20.000 service hours, the chamber will be sufficient for taking up the grease used. It is recommended to have the bearings cleaned and inspected by an expert every 3 to 5 years. If the motors are exposed to a high degree of humidity and comparatively heavy contamination the bearings should be cleaned at shorter intervals. For cleaning, commercial gasoline should be used. Please see to it that the same brand of grease is used for refilling or relubricating.
5. Unless the type of grease has been specified in the purchase order or to cope with special load conditions in the bearings, we have lubricated the motor with a bearing grease based on lithium, type K3k according to DIN 51825, viscosity No.3 in the case of motors without relubricating device, which are designed for continuous operation under normal operating conditions and for direct coupling to the machine to be driven, the first filling is sufficient for 20.000 service hours for motors with 4 (1500 rpm) and more poles, 10.000 service hours for 2 (3000 rpm) poles motors. In the presence of severe operating conditions, e.g. high humidity, a comparatively high degree of pollution, high or changing load on bearings ambient temperature above 45 ° C, the lubrication intervals should be shortened. The motor should be lubricated while running wherever this procedure does involve any risk. The used grease will be collected in a special chamber provided in the end shields.
6. Check data on the rating plate. The voltage marked on the rating plate must be in agreement with mains voltage.
7. The terminal board is normally equipped with 6 terminals. Details concerning the connection can be seen from the diagram provided in the terminal box. For instance, in the case of 220 / 400V ( $\pm 10\%$ ) the links have to be connected as follows, depending on the line voltage available :

# ELECTRIC MOTORS



220 / 240 V - DELTA CONNECTION  $\Delta$



400 / 440 V - STAR CONNECTION  $Y$

In principle the star connection is always associated with the higher voltage. In the event a star-delta starter is used no links are required on the terminal board, and all 6 terminals are connected to the corresponding terminals of the switch. Please note that the rating plate should be marked 220/400 V or 220 V  $\Delta$  in the case of a voltage of 220 V between the phases, and 400 V  $\Delta$  in the case of a line voltage of 400 V. (415 V Where Available) The motors windings are Y 400 V up to 3 kW for 2-4 poles, 2.2 kW for 6 poles, 1.5 kW for 8 poles and  $\Delta$  400 V for higher output values.

8. Specifications VDE 0530 and VDE 0100 require that all motors be connected to the protective conductor. Please use the terminal box marked with a protective symbol for this purpose. One of the four clearance holes on the terminal box has to be opened in order to mount the cable entry joint.
9. The admissible temperatures for the motor winding are determined in VDE 0530, part 1, for the different insulation classes. The list below shows the limit temperatures for normal motors.

Insulation Class	Maximum permissible limit temperature in °C
E	120
B	130
F	155
H	180

The motors are extended that the admissible limit temperatures at nominal load and ambient temperature of 45 °C as well as installation height up to 1000 m over sea level, will not be exceeded (unhindered ventilation assumed). Appointments different here from are marked on the rating plate. Loads or ambient temperatures, leading to a higher winding temperature, shorten the service life of the motor. To avoid inadmissible heating, motors should be protected against intensive solar radiation.

10. To avoid the danger of overloading, operation on 2 phases, or short circuit in motors, these should be protected either with fuses, thermal, thermo-magnetic switches or electronic circuits.

# ELECTRIC MOTORS



## 3 PHASE CAGE INDUCTION MOTORS WORKING VALUES

TYPE	FULL LOAD WORKING VALUES														DIRECT START VALUES (380 V)			
	POWER		CURRENT			d/d	Power Factor $\cos\phi$	Efficiency $\eta$	Moment	Start Current (Ik/In)		$\Delta$ Start Moment (Mk/Mn)		OverTurn M.	Wi			
			220 V	380 V	500 V							%	% Y			%	% Y	
	Kw	HP	A	A	A	1/dk.	Cos	$\eta$	kgm	%	% Y	%	% Y	%	kg			
<b>2 Poles , 3000 rpm , 50 Hz</b>																		
63 2a	0.18	1/4	1.124	0.65	-	2750	0.74	0.580	0.063	-	370	-	270	-	3.9			
63 2b	0.25	1/3	1.211	0.70	-	2840	0.75	0.730	0.085	-	470	-	350	-	4			
71 2a	0.37	1/2	1.68	0.97	0.74	2800	0.83	0.710	0.129	-	430	-	300	256	5.8			
71 2b	0.55	3/4	2.14	1.24	0.94	2830	0.86	0.790	0.190	-	600	-	300	275	6.7			
80 2a	0.75	1	3.11	1.80	1.37	2790	0.86	0.735	0.264	-	525	-	280	260	8.7			
80 2b	1.1	1.5	4.45	2.57	1.95	2815	0.82	0.790	0.380	-	530	-	260	255	10.2			
90 S-2	1.5	2	5.68	3.28	2.50	2820	0.88	0.785	0.520	-	570	-	230	250	12.8			
90 L-2	2.2	3	8.25	4.77	3.63	2835	0.85	0.820	0.760	-	560	-	265	290	15.5			
100 L-2	3	4	11.85	6.85	5.20	2845	0.85	0.790	1.030	-	610	-	190	297	18.3			
112 M-2	4	5.5	13.80	8.00	6.00	2880	0.89	0.850	1.350	690	223	235	82	250	28			
132 S-2a	5.5	7.5	20.80	12.00	9.10	2870	0.82	0.840	1.860	560	192	275	76	290	39			
132 S-2b	7.5	10	25.60	14.80	11.25	2880	0.90	0.850	2.530	625	202	255	75	300	43			
<b>4Poles , 1500 rpm , 50 Hz</b>																		
63 4b	0.18	1/4	0.865	0.50	-	1370	0.78	0.700	0.127	-	420	-	240	-	4.4			
71 4a	0.25	1/3	1.38	0.80	0.60	1380	0.72	0.660	0.176	-	400	-	175	170	5.7			
71 4b	0.37	1/2	1.57	0.91	0.69	1410	0.80	0.770	0.255	-	500	-	250	217	6.3			
80 4a	0.55	3/4	2.60	1.50	1.14	1380	0.76	0.730	0.387	-	400	-	200	200	8.6			
80 4b	0.75	1	3.34	1.93	1.47	1395	0.75	0.783	0.523	-	440	-	235	245	9.9			
90 S-4	1.1	1.5	4.75	2.75	2.10	1380	0.80	0.760	0.775	-	430	-	230	250	12.5			
90 L-4	1.5	2	6.00	3.47	2.65	1405	0.81	0.805	1.038	-	500	-	250	270	15.4			
100 L-4a	2.2	3	9.10	5.25	3.99	1420	0.80	0.800	1.550	-	550	-	215	255	18.4			
100 L-4b	3	4	12.23	7.10	5.40	1420	0.80	0.813	2.050	-	590	-	240	285	21.4			
112 M-4	4	5.5	15.60	9.00	6.84	1420	0.81	0.830	2.740	570	178	300	102	280	32			
132 S-4	5.5	7.5	20.70	12.00	9.10	1440	0.82	0.850	3.710	565	185	245	71	275	44			
132 M-4	7.5	10	27.00	15.60	11.85	1448	0.84	0.870	5.030	630	186	269	82	284	54			
<b>6Poles , 1000 rpm , 50 Hz</b>																		
71 6a	0.18	1/4	1.45	0.84	0.64	915	0.59	0.550	0.191	-	270	-	200	210	5.5			
71 6b	0.25	1/3	1.82	1.00	0.80	915	0.65	0.580	0.240	-	300	-	200	205	5.6			
80 6a	0.37	1/2	1.90	1.10	0.84	915	0.75	0.680	0.394	-	345	-	190	190	9.7			
80 6b	0.55	3/4	2.76	1.60	1.22	917	0.73	0.720	0.583	-	350	-	230	230	10.4			
90 S-6	0.75	1	3.81	2.20	1.67	917	0.72	0.710	0.795	-	340	-	220	230	12.4			
90 L-6	1.1	1.5	5.22	3.05	2.32	907	0.74	0.740	1.180	-	375	-	180	190	14.9			
100 L-6	1.5	2	6.40	3.70	2.82	940	0.77	0.800	1.552	-	480	-	225	230	21.4			
112 M-6	2.2	3	8.85	5.12	3.90	940	0.80	0.815	2.277	-	530	-	250	260	31			
132 S-6	3	4	12.93	7.50	5.70	945	0.76	0.860	3.088	640	160	235	46	255	35			
132 M-6a	4	5.5	16.60	9.60	7.30	950	0.78	0.810	4.096	670	188	240	80	295	51			
132 M-6b	5.5	7.5	22.30	12.90	9.80	945	0.80	0.810	5.520	670	198	250	75	295	56			